	Application No.	Applicant(s)	
Notice of Allowability	10/016,499	AKOPIAN, DAVID	
	Examiner	Art Unit	
	Jason M. Perilla	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to *the amendment filed March 10, 2006*.

2. ☒ The allowed claim(s) is/are *claims 1, 2, 5-7, and 10-12 renumbered respectively as claims 1-8*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

        Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20060522* .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

EXAMINER'S AMENDMENT

1.   Claims 1, 2, 5-7, and 10-12 are pending in the instant application.

2.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Keith Obert on March 23, 2006.

The application has been amended as follows wherein the following versions of

claims 1, 2, 5-7 and 10-12 replace all prior versions of the claims in their entirety:

1. A method for determining information about a carrier frequency of a signal
transmitted by a possibly moving transmitter, the signal having a code component and a
carrier component at the carrier frequency, the method comprising:

a) a step (100) of responding to successive approximately carrier-demodulated
received signal fragments of the signal (102), and providing a set (104) of correlation
results indicating information about the a correlation of the successive approximately
carrier-demodulated received signal fragments with phase-shifted replicas of the code
component and any remaining carrier component, wherein the successive approximately
carrier-demodulated received signal fragments are formed using different possible
offsets from a nominal carrier frequency, and further wherein each element of the set
(104) is provided as a phasor $(c_{p,m})$ having a magnitude and a phase; and

b) a step (106) of responding to the set (104) of phasors, selecting the phasor $(c_{p,m})$
having a magnitude distinguishing it from all the other elements $(c_{p,m})$ of the set (104),
and determining the phase of the selected phasor;

wherein the step (100) of providing the set (104) of correlation results includes a step
(11) of performing a coherent integration of each of a series of the successive
approximately carrier-demodulated received signal fragments, and a step (12) of

performing a non-coherent integration in which phasor results of the coherent integrations are combined without regard to phase; and

further wherein the step (12) of performing the non-coherent integration involves multiplying each element of a matrix of correlation results provided using a coherent integration of a first signal fragment, by the complex conjugate of a corresponding element for an immediately preceding signal fragment.

2. A method as in claim 1, wherein the set (104) of correlation results is a matrix of correlation results, and further wherein the matrix of correlation results is spanned by an index (m) indicating an offset from a nominal carrier frequency and also by an index (p) indicating a replica code phase, and still further wherein the selected phasor $(c_{p,m})$ is the phasor having the maximum magnitude of all the elements of the set (104).

5. A method as in claim 2, wherein in providing the matrix of correlation results as phasor values $(c_{p,m})$ and in determining the phase of the phasor having the maximum magnitude of all the elements of the matrix, only at most two phasor values $(c_{p,m})$ are held in a memory device at any instant of time, and of the two phasor values, only the phasor value $(c_{p,m})$ having the larger magnitude is saved in the memory device before calculating a next phasor value $(c_{p,m})$.

6. An apparatus (23) for determining information about a carrier frequency of a signal transmitted by a possibly moving transmitter, the signal having a code component and a carrier component at the carrier frequency, the apparatus comprising:

a) means (300), responsive to successive approximately carrier-demodulated received signal fragments of the signal (302), for providing a set (304) of correlation results indicating information about the a correlation of the successive approximately carrier-demodulated received signal fragments with phase-shifted replicas of the code component and any remaining carrier component, wherein the successive approximately carrier-demodulated received signal fragments are formed using different possible offsets from a nominal carrier frequency, and further wherein each element of the set (304) is provided as a phasor $(c_{p,m})$ having a phase and a magnitude; and

b) means (306), responsive to the set (304) of phasors $(c_{p,m})$, for selecting the phasor $(c_{p,m})$ having a magnitude distinguishing it from all the other elements $(c_{p,m})$ of the set (304), and determining the phase of the selected phasor $(c_{p,m})$, and for providing information about the carrier frequency based on the phase of the selected phasor $(c_{p,m})$;

wherein the means for providing the set (304) of correlation results includes means (31), responsive to a series of received signal fragments, for performing a coherent integration of each of the series of the successive approximately carrier-demodulated received signal fragments, and also means (32), responsive to the coherent integrations, for providing a non-coherent integration in which phasor results of the coherent integrations are combined without regard to phase; and

further wherein the means (32) for performing the non-coherent integration multiplies each element of a matrix of correlation results provided using a coherent integration of a first received signal fragment, by the complex conjugate of a corresponding element for an immediately preceding received signal fragment.

7. An apparatus as in claim 6, wherein the set (304) of correlation results is a matrix of correlation results, and further wherein the matrix of correlation results is spanned by an index (m) indicating an offset from a nominal carrier frequency and also by an index (p) indicating a replica code phase, and still further wherein the selected phasor $(c_{p,m})$ is the phasor having the maximum magnitude of all the elements of the set (304).

10. An apparatus as in claim 7, wherein in providing the matrix of correlation results as phasor values $(c_{p,m})$ and in determining the phase of the phasor having the maximum magnitude of all the elements of the matrix, only at most two phasor values $(c_{p,m})$ are held in a memory device at any instant of time, and of the two phasor values, only the phasor value $(c_{p,m})$ having the larger magnitude is saved in the memory device before calculating a next phasor value $(c_{p,m})$.

11. A system, including: a transmitter for transmitting a signal having a code component and a carrier component, and a ranging receiver for receiving the signal and for determining information about the carrier frequency of the signal, the ranging receiver characterized in that it comprises:

a) means ~~(300)~~, responsive to successive approximately carrier-demodulated received signal fragments <u>of the signal</u> ~~(302)~~, for providing a set ~~(304)~~ of correlation results indicating information about ~~the~~ <u>a</u> correlation of the successive approximately carrier-demodulated received signal fragments with phase shifted replicas of the code component ~~and any remaining carrier component~~, wherein the successive approximately carrier-demodulated received signal fragments are formed using different possible offsets from a nominal carrier frequency, and further wherein each element of the set ~~(304)~~ is provided as a phasor ~~$(c_{p,m})$~~ having a phase and a magnitude; and

b) means ~~(306)~~, responsive to the matrix ~~(304)~~ of phasors ~~$(c_{p,m})$~~, for selecting the phasor ~~$(c_{p,m})$~~ having a magnitude distinguishing it from all the other elements ~~$(c_{p,m})$~~ of the set ~~(304)~~, and determining the phase of the selected phasor ~~$(c_{p,m})$~~, and for providing information about the carrier frequency based on the phase of the selected phasor ~~$(c_{p,m})$~~;

wherein the means for providing the set ~~(304)~~ of correlation results includes means ~~(31), responsive to a series of received signal fragments,~~ for performing a coherent integration of ~~each of the series of~~ <u>the successive approximately carrier-demodulated</u> received signal fragments, and also means ~~(32)~~, responsive to the coherent integrations, for providing a non-coherent integration in which phasor results of the coherent integrations are combined without regard to phase; and

further wherein the means ~~(32)~~ for performing the non-coherent integration multiplies each element of a matrix of correlation results provided using a coherent integration of a first received signal fragment, by the complex conjugate of a corresponding element for an immediately preceding received signal fragment.

12.   The system as in claim 11, further comprising a computing resource external to the ranging receiver, and wherein an apparatus communicates information to the computing resource via a wireless communication system and the computing resource provides at least some of the computation needed either to provide the set of correlation results or to determine the selected phasor ~~$(c_{p,m})$~~.

Claims 1, 2, 5-7, and 10-12 are renumbered respectively as claims 1-8,

and the claim dependency is renumbered accordingly.

Allowable Subject Matter

3.   Claims 1, 2, 5-7, and 10-12 renumbered respectively as claims 1-8 are allowed.

4.   The following is an examiner's statement of reasons for allowance:

Claims 1, 2, 5-7, and 10-12 renumbered respectively as claims 1-8 are allowed because the prior art of record, namely U.S. Pat. No. 6577271 to Gronemeyer, discloses integration of the current integration value with all previous integration values by taking a sum of squares while the integration of the instant application involves multiplying each element by the complex conjugate of a corresponding element for an immediately preceding signal fragment.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Perilla whose telephone number is (571) 272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason M. Perilla
May 22, 2006

jmp

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER